the three systems, and hence includes almost all the annual plants. Few of these annuals penetrate the soil deeper than 20 cm., and most of the lateral branches are less than half this distance from the surface. Competition is evident between the various members of the generalized type, and also between them and those of the first specialized class. The best development of root systems is found in the summer annuals, due to more favorable vegetative conditions, and particularly to more favorable soil temperature during that portion of the year.

The details of root development in the various species are illustrated by many photographs and drawings, while the detailed descriptions contain many interesting facts concerning the different plants.—GEO. D. FULLER.

**Chromatophores and chondriosomes.**—FORENBACHER[14] has made a study of the origin of chloroplasts and leucoplasts in the stem and root of *Tradescantia virginica*, the object of which is to show the origin of these structures from chondriosomes (filamentous mitochondria). Beginning with the fully formed chloroplasts of the stem cortex and leaves and proceeding toward the tip, he finds a complete gradation between the fully formed chloroplasts and the chondriosomes. The intermediate forms present themselves as dumbbell and granular structures which gradually pass over into the chromatophores. Similar gradations are found between the chondriosomes (mitochondria) of the root tip and the leucoplasts. This work thus confirms the results of PENSA and LEWITSKY and those of GUILLIERMOND on the origin of the chloroplasts from mitochondria (chondriosomes).

Some doubt is justified of the efficiency of the methods employed for demonstrating the chondriosomes of plant cells. MEVES, for example, found these structures in the tapetal cells of *Nymphaea*, but not in the spore mother cells, in which, however, by suitable methods they may be shown to be very numerous. The reason was the small power of penetration of the fixing fluid, which did not reach the deeper tissues before the mitochondria had undergone change or disappeared. In eliminating acetic acid wholly from his fixing fluid, FORENBACHER has diminished its already slight power of penetration. His figures are not convincing, for the structures labeled as chondriosomes do not conform in shape or number to the usual condition in rapidly dividing cells of higher plants. It is quite possible that his young chloroplastids do not belong to the category of mitochondria (chondriosomes) at all.—R. R. BENSLEY.

**Vascular anatomy of Salicales.**—Miss HOLDEN[15] has investigated the position of Salicales on the basis of the vascular anatomy of the North American

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[14] FORENBACHER, AUREL, Die Chondriosomen als Chromatophorenbildner. Ber. Deutsch. Bot. Gesells. **29:** 648–660. *pl. 25.* 1911.

[15] HOLDEN, RUTH, Reduction and reversion in the North American Salicales. Ann. Botany **26:** 165–173. *pls. 20, 21.* 1912.

representatives. In the ENGLER arrangement, based on floral characters, they are one of the three most primitive groups of the Archichlamydeae. Most of the eastern representatives of the group have uniseriate rays and "terminal" parenchyma ("only at the end of the annual ring") in the stem cylinder, but in the conservative regions multiseriate rays and vasicentric parenchyma are found. This latter combination is found also in the stem cylinders of certain western forms. The conclusion from these facts is that multiseriate rays and vasicentric parenchyma represent the primitive condition of the group, and that their present simple structure is due to a reduction from a more complex structure. This means that, according to the testimony of vascular anatomy, the Salicales should be transferred from a very low position to a relatively high one among the Archichlamydeae.—J. M. C.

**The fruit of Compositae.**—LAVIALLE[16] has begun the publication of a volume of observations on the development of the wall of the akene of the Compositae, a complex of testa and pericarp. The first chapter and part of the second have appeared in the *Annales* as cited. Since 298 species, representing 65 genera, have been studied, the number of observations are very great. Just what the value of them will be is also obvious. In the account of the "actual state of knowledge of the structure of the fruit of Compositae," the actual state of knowledge of the author is very apparent. The citations are few, and apparently no contributions in English were available.—J. M. C.

**A new Cordaites.**—Miss BENSON[17] has described a new species of *Cordaites* from a fairly well preserved specimen obtained from the coal mines at Shore, England. It is compared with related species, and the intimation is given that along with *C. Wedekindi* Felix it may represent a new genus, whose seeds are already suspected to be those of a *Mitrospermum* closely associated with it in the deposit. The whole leaf is said to have "a markedly xerophilous character."—J. M. C.

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[16] LAVIALLE, P., Recherches sur le développement de l'ovaire en fruit chez les Composées. Ann. Sci. Nat. Bot. IX. **15**: 39–64. 1912.

[17] BENSON, MARGARET, *Cordaites Felicis*, sp. nov., a cordaitean leaf from the Lower Coal Measures of England. Ann. Botany **26**: 201–207. *pl. 22. fig. 1.* 1912.